# Math 557 Sep 26

## Midterm 1 Review

**!** Take-home Problem

Prove **unique readability** for the set of $\mathcal{L}$-formulas.

**!** Take-home Problem

Let $\mathcal{L}$ be any finite language and let $\mathcal{M}$ be a finite $\mathcal{L}$-structure. Show that there is an $\mathcal{L}$-sentence $\varphi$ such that

$$\mathcal{N} \models \varphi \iff \mathcal{N} \cong \mathcal{M}.$$

**!** Take-home Problem

Give an example of a language $\mathcal{L}$ and an $\mathcal{L}$-sentence $\psi$ such that

- there is at least one $\mathcal{L}$-structure $A$ such that $A \models \psi$,
- for all $L$-structures $A$, if $A \models \psi$, then the universe $A$ of $A$ is infinite.

**!** Take-home problem

Show that

$$\{\varphi \to \psi\} \vdash \exists x\varphi \;\to\; \exists x\psi$$
$$\{\varphi \to \psi\} \vdash \forall x\varphi \;\to\; \forall x\psi$$

**!** Take-home Problem

Show that for every $\mathcal{L}$-formula $\varphi$,

$$T_H \vdash_{\mathcal{L}_H} \varphi \iff T \vdash_{\mathcal{L}} \varphi$$

**!** Take-home Problem

Use the compactness theorem to show (without using the Axiom of Choice) that every set can be linearly ordered.
Try to trengthen this to:
Every partial order can be extended to a linear order.